

REMARKS ON CERTAIN NEW ENGLAND CHITONS WITH DESCRIPTION  
OF A NEW VARIETY.

BY FRANCIS N. BALCH.

The recent announcement by Dall [ '05 a. and b.] of a new *Chiton* from New England—the first local addition to the group in many years—makes this a favorable moment to introduce an allied novelty with a few remarks.

*Tonicella Blaneyi* Dall, was founded on a single specimen dredged by Dwight Blaney, Esq., of Boston, off Ironbound Island, Frenchman's Bay, Maine, in twenty fathoms.

Its diagnostic marks consist substantially in conspicuously radially ribbed lateral areas and terminal valves.

Dall says it seems: "somewhat intermediate between *Tonicella* and *Trachydermon*, with a leaning toward the former, while it seems to be most nearly related specifically to *Tonicella marmorea*"—an opinion in which I concur.

But this "intermediate" character raises the whole question of the true relation of these forms, which I now propose to discuss.

*Trachydermon ruber* and *Tonicella marmorea* are both common north of Cape Cod in from five to one hundred fathoms; the former, in my experience, outnumbering the latter (which favors the deeper waters,) at least ten to one.

They much resemble one another and in fact Gould [ '70] (who retained them both in the Linnean genus *Chiton*) says of *ruber*: "It is not difficult to distinguish at sight well marked individuals of this species from those of *C. fulminatus*" (i. e., *Tonicella marmorea*.) "But there are intermediate specimens which it is not easy to pronounce upon. In general, this species is smaller, more solid, more convex, the valves more beaked, lines of growth more deep, the zig-zag lines never appearing, though the posterior margin of the valve is sometimes dotted with white and red. The impunctured or ungranulated surface, however, is the best, as it is a constant, characteristic."

But Gould's diagnostic points will not stand. The color-patterns do duplicate, and the surface of *ruber* is punctate, as Dall has himself pointed out [ '79]. I may add that in the coarseness of the punctation the two overlap.

The fact is, as Gould indicates, that while the extremes of the two

forms are well separated the series yet approach very near if they do not overlap.

In spite of this the two are to-day almost universally placed by American and British malacologists in two distinct genera—genera which, in Pilsbry's monograph [Pilsbry '92] are rather widely separated.

I propose very briefly to review their recent generic history.

Both were included in Gray's genus *Ischnochiton*, from which Carpenter ['63] split off *Trachydermon* as a sub-genus, naming no type though his own *retiporosus* was the first of the species referred to it. Neither *ruber* nor *marmoreus* was mentioned. He later declared it corresponded to the "second section" of Gray's *Ischnochiton* " \* \* \* scales of mantle minute, granule-like," and raised it to the rank of a genus.

In 1873 [Carpenter '73] he published brief and informal, but important, notes of his observations on the *Chitons* of our New England Coast made during work with our Fish Commission expeditions. Of *C. ruber* he said: "It belongs to Gray's genus *Ischnochiton*, \* \* \* 'section †, mantle scales minute, granular;' but as the gill-rows are short \* \* \* it is necessary to establish a fresh genus, *Trachydermon* \* \* \*."

Of *C. albus*—now by far the commonest species all along our shore, outnumbering *ruber* and *marmorea* combined a great many times over and scarcely to be missed by any dredger—he said: "I twice captured a live specimen; but each time it eluded the aftersearch. I do not doubt that this is also a *Trachydermon* \* \* \*." While not germane to the present inquiry this is interestingly suggestive of changes in the *Chiton* census.

Of *C. marmoreus*, he said: [it] "is *Tonicia* of H. Adams and Gray, simply because the girdle is smooth. The true southern *Tonicia*æ, however, have pectinated insertion-plates and ambient gills, like the typical *Chitons*; while the northern species so-called have sharp plates and short gills. They differ, in fact, from *Trachydermon* simply in the girdle being destitute of the minute scales. I distinguish the group as *Tonicella*."

This is the origin of the latter genus, which we now know is far removed from true *Tonicia*.

*Tonicella*, then, was originally nothing but a scaleless-girdled *Trachydermon*, with *marmorea* as its type-species. I have looked in

vain through Dall ['79,] Fischer ['87,] Pilsbry ['92] and other leading modern authorities for some other tangible distinction between the two genera, but all the cited authors retain the two nearly in the exact Carpenterian sense above given, though the single diagnostic difference results in their rather wide separation under Pilsbry's scheme.

The trouble with this single diagnostic difference is that according to my observations it does not exist in the type-species, *marmorea*.

According to my observations neither *ruber* nor *marmoreus* has scales, strictly speaking. In both (in *ruber* always, in *marmorea* usually) the girdle is set with minute, stumpy spines. In *ruber* these have some such shape as a thimble or short finger-cot and are thick-set, giving a shagreen-like surface, while in *marmorea* they are proportionately longer and thinner, commonly absolutely much smaller, usually (if not always) much less thickly set, often very sparse indeed and apparently sometimes lacking entirely.

In other words my observations bear out the beautiful accuracy of Sars ['78,] Tab. 8, figs. 3 a.—1. and 4 a.—1., on the basis of which he erected the genus *Boreochiton* expressly to contain our two forms, in ignorance of Carpenter's prior *Trachydermon*.

If Sars' figures and my observations are correct there is no more ground for generically separating *ruber* and *marmorea* on the basis of girdle-character [and no other has been suggested] than there would be for putting No. 3 and No. 1 sandpapers in different genera. If indeed the two species do not actually intergrade in this character, at least the difference between the coarsest and finest (or naked) *marmorea* is far greater than the difference between the coarsest *marmorea* and the finest *ruber*.

The upshot is that I feel confident *marmorea* must be removed to *Trachydermon* and stand close beside *T. ruber*. What is to become of *Tonicella* after the removal of its type-species to a prior genus I leave to others.

Admitting that *ruber* and *marmorea* stand close beside one another in the same genus, how are they specifically distinguished? I think the answer must be—only by what Dall calls "the sum of the characters." Gould's supposed diagnostic differences have been dealt with already. Great as is the apparent difference between the rough red-and-white striped narrow girdle of an extreme *ruber* and the smooth, leathery, green, wide girdle of an extreme *marmorea* they almost if not entirely overlap on this point also.

The most reliable features known to me are the arrangement of the notches and radial canals of the anterior valves (which in *marmorea* are confined to a central segment of say  $100^{\circ}$ , while in *ruber* they spread through nearly  $180^{\circ}$ , the limiting pair being obscure); and the form of the tegumentum of the mid-valves (which in *marmorea* has a rather sharply convex anterior edge, and in *ruber* concave or sinuated). These characters are ascertained in so few specimens that I am not sure how constant they are.

I have no doubt, however, that *ruber marmorea*, taking the "sum of the characters," are quite valid species as such things go.

With these conclusions behind us, let us take up the new forms to be discussed.

The affinities of *T. Blaneyi* may be analyzed as follows<sup>1</sup>: girdle-covering, like *marmorea*; girdle-color, like *marmorea*; punctation, like *ruber*; notches and canals (anterior valve,) like *marmorea*; form of tegumentum (mid-valves,) like *ruber*.

I may add that, examining large series for ribbed specimens, I find distinct though slight "ribbing" of the anterior valve in several specimens of *ruber* but none in *marmorea*.<sup>2</sup>

What, now, is *T. Blaneyi*? It may be pathological, but nothing suggests it. It may be a unique specimen of an established distinct species, but if so, since said to be conspicuous and occurring in much-worked waters, it must be highly local or excessively rare. It may be a "connected variant" of *marmorea*, but the intermediate stages of "ribbing" are missing, occurring rather in *ruber*; it may be a "connected variant" of *ruber*, but seems closer to *marmorea*; it may be a "disconnected variant," "sport" or "mutant," which will either become extinct or found a species and which merely happens to come from the *ruber* end of the *marmorea* series. Finally, it may be a hybrid, with the *ruber* tendency to wrinkling (possibly arces-tral?) intensified by the cross as is not uncommon in such cases. My own provisional judgment would be for the latter.

While Mr. Blaney was working in Frenchman's Bay I was at work (in the summer of 1899 and 1901) in the next bay west—Blue Hill Bay. My richest ground was a small, stony area in about 12 fathoms off Harriman's Point where *T. ruber* was abundant while

<sup>1</sup> Based entirely on Dr. Dall's descriptions and figures. The unique specimen is in the U. S. Nat. Mus.

<sup>2</sup> Series much smaller.

*T. marmorea* was rather uncommon—as indeed I found it throughout. On this spot I dredged the form described below—one adult and one half grown in 1899, and a young specimen in 1901.

*Tonicella ruber* (Lowe) var. *index*. nov.

In every respect typical except in color,<sup>1</sup> which is in life an ivory-white slightly-tinged with green (taking on in alcohol or formol the exact appearance of old ivory tinged faintly with yellow,) highly polished and absolutely unmarked except for a few extremely faint and minute light pink dots on the posterior edges of the mid-valves and a very conspicuous dark purple elongated triangle pointing posteriorly on the keel of the fifth valve. Girdle very pale, otherwise typical.

A color variety connected with the typical form by intermediate stages is perhaps not worth describing, but this form, while clearly close to typical *ruber*, appears to be quite discontinuous. Dr. Dall pronounces it new to him, which is practically to say new to science.<sup>2</sup> In spite of the fact that the mark on the fifth valve is often recognizable in typical specimens (and is probably present in all, though disguised by the strong color-patterns) and in spite of the fact that very pale, almost white, valves frequently occur and sometimes (as Dall has noted) to the number of four or five in a single specimen, yet the present variety can be distinguished from any other specimen of *ruber* I have ever seen, across an ordinary room. It is not a mere case of faintness of the rosy markings. The markings are wiped out and a totally new color scheme (viz. green) introduced. My three specimens, dredged two years apart, are absolutely indistinguishable except for size. The first specimen dredged was adult (probably hatched the year previous) the last very young (probably breeding the next year.) It is, therefore, not connected with age and has persisted on the same spot probably for at least four years; but is not a true geographical race (in the sense, for instance in which ornithologists use the term) since it is a cohabitant with the typical form.

What, then, is *T. ruber* var. *index*? It may be pathological, or a “physiological variety”—an albino in short—but it’s local persist-

---

<sup>1</sup> Radula not examined.

<sup>2</sup>In this connection *Chiton marmoreus* var. *cæruleus* Winkley should be considered. See NAUTILUS VIII, p. 78, 1894.—ED.

ence for at least four years looks otherwise. It is scarcely a "variety" in the ordinary sense, for the intermediate terms are completely lacking. It is a "sport" or "mutant" in the sense of a discontinuous variant, breeding true and founding a new centre of variation? To my mind the evidence, while wholly inconclusive, suggests that possibility.

*T. Blaneyi* and *T. ruber* var. *index*, add two extremely interesting problems to New England malacology-problems which are all the more interesting because further work by Mr. Blaney or some other fortunately situated student, should go far to yield a solution in the course of a few years.

I may add that the feature from which var. *index* takes its name—the striking dark backward-pointing triangle on the keel of the fifth valve—suggests an interesting inquiry of a different nature. It appears to be a very wide spread and definite feature, appearing in various species in various groups, now more, now less disguised by conflicting color-patterns. It is by no means confined to the fifth valve though commonest there. I find no notice of this odd *Chiton* character in such examination of the literature as I have been able to make. The fifth valve appears to have no specially significant topographical relation with the internal anatomy, nor, indeed, is the hollow of the keel in any of the valves occupied by any special organ so far as I know. Has this mark, then, relation to some specialization of the complicated tegumentary system of organs?<sup>1</sup>

*Jamaica Plain, Mass., September, 1906.*

#### PAPERS CITED.

CARPENTER, PHILIP P.

[ '63 ] Supplementary report on the present state of our knowledge with regard to the Mollusca of the west coast of North America. Rep. Brit. Assoc. Adv. Sci., 1863, pp. 517-686.

[ '73 ] On the generic affinities of New England Chitons. Bull. Essex Inst., V. No. 9, pp. 152-154, Sep. 1873, (Reprinted in Ann. & Mag. Nat. Hist., 4th Ser., v. XIII, pp. 119-123, 1874.)

---

<sup>1</sup>Postscript. Since the above was written I have noted that in the "List of British Marine Mollusca" published in 1902 by a committee of the Conchological Society of Great Britain and Ireland—apparently a very careful revision in the course of which generic questions were well considered—*T. ruber* and *T. marmorea* are, indeed, united in one genus, but that genus is *Tonicella*. How this result was reached I do not know.

DALL, WM. H.

[ '79] Report on the Limpets and Chitons of the Alaskan and Arctic Regions, with descriptions of Genera and Species believed to be new. Proc. U. S. N. M., pp. 281-344, pl. i-v., 1879. (Republished as Art. IV in "Sci. Results of Exploration of Alaska.")

[ '81] On the genera of Chitons. Proc. U. S. N. M., pp. 279-291, 1881.

[ '05 a] A new Chiton from the New England Coast. Proc. Biol. Soc. Wash. xviii, pp. 203-204, Sept. 2, 1905.

[ '05 b] A new Chiton from the New England Coast. NAUTILUS, xix. No. 8, pp. 88-90, pl. IV, Dec. 1905.

FISCHER, PAUL.

[ '87] Manuel de Conchyliologie, etc., Paris, 1887.

GOULD, AUGUSTUS A.

[ '70] Report on the Invertebrata of Massachusetts. 2d. ed. (Binney's) Boston, 1870.

PILSBRY, HENRY A.

[ '92] Manual of Conchology, structural and systematic. Vol. XIV. Polyplacophora. Philadelphia, 1892.

POSSELT, HENRY J.

[ '98] Grönlands Brachiopoder og Bløddyr. Conspectus Faun. Groenlandic., i, pp. i-xix, 1-298, pl. 1-ii and map. Copenhagen (?) 1898.

SARS, G. O.

[ '78] Mollusca Regionis Arcticæ Norvegiæ Bidrag til kundskab. om Norg. Ark. Faun., I, pp. I-XVI, 1-466, pl. 1-34 and I-XVIII and Map. Christiania, 1878.

---

#### SOME OBSERVATIONS ON THE OVA OF UNIONIDÆ.

---

BY L. S. FRIERSON.

---

When the ova of those species of Unionidæ, with which I am acquainted, are first noted in the marsupia, they are spherical in shape, and consist of a single mass of yolk, surrounded with a clear fluid, probably albumen, all confined in a spherical egg-shell membrane. Soon after fertilization takes place, the yolk undergoes segmentation, and goes through a "mulberry" stage, and finishes with the familiar glochidium. Several interesting facts have been noted, which may prove of interest. Some young ova of a *Quadrula trapezoides* Lea were under observation, and being called off a short time, on my return I noticed that some of the ova had changed their